BISS Biodiversity Information Science and Standards

Biodiversity Information Science and Standards 9: e179182
doi: 10.3897/biss.9.179182

OPEN ACCESS

Conference Abstract

A FAIR and Open Approach for the Study and Integrated Management of Invasive Alien Species in Italy

Cristina Di Muri[‡], Ernesto Azzurro[§,|], Pierluigi Strafella[§,|], Ilaria Rosati[‡,|]

‡ National Research Council (CNR), Research Institute on Terrestrial Ecosystems (IRET), Lecce, Italy
§ National Research Council (CNR), Institute for Marine Biological Resources and Biotechnology (IRBIM), Ancona, Italy
| NBFC, National Biodiversity Future Center, Palermo, Italy

Corresponding author: Cristina Di Muri (cristina.dimuri@cnr.it), Ilaria Rosati (ilaria.rosati@cnr.it)

Received: 20 Nov 2025 | Published: 24 Nov 2025

Citation: Di Muri C, Azzurro E, Strafella P, Rosati I (2025) A FAIR and Open Approach for the Study and Integrated Management of Invasive Alien Species in Italy. Biodiversity Information Science and Standards 9: e179182. https://doi.org/10.3897/biss.9.179182

Abstract

Notwithstanding the global interest and ongoing efforts to manage Invasive Alien Species (IAS), limit their spread and/or their impact on native communities and ecosystems, the path to this goal remains lengthy and fraught with significant challenges.

A variety of approaches to support an efficient management of IAS have been outlined, including effective data sharing, iterative collaboration between stakeholders, as well as scientific communication and engagement, among others (Onley et al. 2025). Specifically for data sharing, several guidelines have emerged to ensure the accurate management and communication of scientific information, including the FAIR (Findable, Accessible, Interoperable, Reusable) principles and open science practices. FAIR adoptions are vital to enable the interoperablity and reusability of digital research products (Wilkinson et al. 2016), and open science enhances their transparency and reliability (Bertram et al. 2023). In addition to such broadly applicable guidelines, specific recommendations and standards have emerged for IAS research and data management (Groom et al. 2017; Groom et al. 2019). Implementing effective data management practices alongside enhanced collaboration and communication between stakeholders can support the evidence-based management of IAS.

© Di Muri C et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

The opportunity to test and validate this integrated approach was provided by USEit - *Use of operational synergies for the study and integrated management of invasive alien species in Italy* - a multidisciplinary, multi-ecosystem, and multi-taxonomic Italian project focusing on IAS. USEit combines expertise from scientists studying IAS in different ecosystems (aquatic and terrestrial) to find synergies across different data collection and data management methods, ultimately outlining operational and technical recommendations suitable for adoption within and beyond the project.

The recommendations were drafted based on an evaluation of the responses to a national survey, subsequently reviewed by national experts of biological invasions, and validated through SWOT analysis, i.e. semi-quantitative analysis of Strengths, Weaknesses, Opportunities, and Threats identified for each recommendation (Azzurro et al. 2025). Such recommendations were adopted and further expanded within USEit. Through this process, detailed technical guidelines for IAS data management were collaboratively defined and incorporated into the project's Data Management Plan (DMP). The DMP was published as a machine-actionable, open access document describing standards, schemas, and repositories used for a diverse array of (meta)data, including occurrences, stable isotopes, elemental composition, remote sensing, DNA metabarcoding, citizen science, and acoustic telemetry (Rosati and Di Muri 2025). Overall, USEit data, services and related metadata are published into open-access repositories and available through the LifeWatch Italy Data Portal and Metadata Catalogue (LifeWatch Italy Data Portal 2025; Tarallo et al. 2025). All digital research products are assigned with persistent identifiers, described by clear metadata and enriched with controlled vocabularies to enable their interpretation, reuse and interoperation. In addition, all digital products generated and published within the project are shared within a unique landing page representing the main access point to USEit research outcomes as well as to communication material and events for public engagements (LifeWatch Italy 2025).

These results could be readily translated into practical solutions for IAS management, showing that the implementation of community-shared FAIR practices across multidisciplinary contexts enhances our ability to manage natural resources effectively while fostering new opportunities for scientific and societal growth.

Keywords

biological invasion, open science, FAIRness, data management, LifeWatch, research infrastructure

Presenting author

Cristina Di Muri

Presented at

Living Data 2025

Acknowledgements

We are grateful to Chiappi M., Ciolfi M., Giacalone V.M., Lauteri M., Loru L., Mancinelli G., Pipitone C., Pollegioni P., Scarcella G. and all members of the USEit team.

Funding program

Progetti di Ricerca @ CNR

Grant title

SAC.AD002.173.001 USEit - Utilizzo di sinergie operative per lo studio e la gestione integrata di specie aliene invasive in Italia - CUP B53C22000880005

Conflicts of interest

The authors have declared that no competing interests exist.

References

- Azzurro E, Strafella P, Bertolino S, Carnevali L, Crocetta F, Di Muri C, et al. (2025) TRACKS: Six good practices for Non-Indigenous Species research and their SWOT evaluation. ARPHA Preprints https://doi.org/10.3897/arphapreprints.e160384
- Bertram MG, Sundin J, Roche DG, Sánchez-Tójar A, Thoré EJ, Brodin T (2023) Open science. Current Biology 33 (15). https://doi.org/10.1016/j.cub.2023.05.036
- Groom Q, Desmet P, Reyserhove L, Adriaens T, Oldoni D, Vanderhoeven S, et al. (2019) Improving Darwin Core for research and management of alien species. Biodiversity Information Science and Standards 3 https://doi.org/10.3897/biss.3.38084
- Groom QJ, Adriaens T, Desmet P, Simpson A, De Wever A, Bazos I, et al. (2017) Seven Recommendations to Make Your Invasive Alien Species Data More Useful. Frontiers in Applied Mathematics and Statistics 3 https://doi.org/10.3389/fams.2017.00013
- LifeWatch Italy (2025) USEit: Use of operational synergies for the study and integrated management of invasive alien species in Italy. https://www.lifewatchitaly.eu/en/pg-related-projects/useit/. Accessed on: 2025-10-14.
- LifeWatch Italy Data Portal (2025) USEit Portal. https://data.lifewatchitaly.eu/collections/dd9e9e9d-893f-4142-8f94-b2200f167c3f?configuration=portals. Accessed on: 2025-10-14.
- Onley IR, Cassey P, McGeoch MA (2025) Biodiversity data sharing platforms are vital for the management and prevention of biological invasions. Biodiversity and Conservation 34 (6): 2247-2257. https://doi.org/10.1007/s10531-025-03058-1

- Rosati I, Di Muri C (2025) USEit Data Management Plan (Version 1). Zenodo. https://doi.org/10.5281/zenodo.15977217
- Tarallo A, Di Muri C, Pulieri M, De Leo F, La Marra M, Raho D, et al. (2025) Managing FAIR Research Products for Biodiversity and Ecosystems Within the LifeWatch Italy Infrastructure. Communications in Computer and Information Science 2694: 324-337. https://doi.org/10.1007/978-3-032-06136-2_31
- Wilkinson M, Dumontier M, Aalbersberg IJ, Appleton G, Axton M, Baak A, et al. (2016) The FAIR Guiding Principles for scientific data management and stewardship. Scientific Data 3 (1). https://doi.org/10.1038/sdata.2016.18